Amendments to the Specification:

- Please amend the **second** sentence in paragraph **0003** as follows:

This invention applies sonic lens, **including both transmitter and reflector** configurations, to attain high power density; i.e., high-rate of energy transfer within a confined volume of material by superposing compression and shear impulses.

- Please amend paragraph **0004** as follows:

[0004] Waveguides, impulse transit delay lines, **resonant elements,** and sonic impedance **transformers** are **also** inherent features of the apparatus disclosed herein. **Said features apply** basic underlying principles of sonic wave behavior and are not **unique to** the description and claims exhibited in the disclosure of this invention.

- Please amend paragraph **0005** as follows:

[0005] In this disclosure: fusion is cohesive joining of contiguous materials, welding is a process of fusion by dispersion of cohesive inhibiting substances, adhesion is the bonding of contiguous dissimilar materials by molecular attraction, and **m**aterials forming is a process of deformation and substructure modification.

- Please amend the **first** sentence in paragraph **0008** as follows:

[0008] One object of this invention is to significantly increase both tensile and shear load properties of joints formed with impulse driven fasteners by introducing an adjunct fusion ring around the fastener.

- Please amend the **second** sentence in paragraph **0014** as follows:

Said sonic lens spatial distribution, **shape, and resonance inducing features** provide for coincident transit times of said sonic compression wave impulse and said sonic shear wave impulse into said work piece.

- Please amend the **fifth** sentence in paragraph **0014** as follows:

Materials in said apparatus are selected for inherent sonic velocity, **resonance** and impedance attributes to attain required impulse transmission, reflection,, refraction, and mode conversion.

- Please amend the **fifth** sentence in paragraph **0019** as follows:

Material displacement is driven by both the external quasistatic downward load depicted by the **letter** Q.

- Please amend the **conclusion** of paragraph **0020** by **inserting** the following sub-paragraph **0020.1**

[0020.1] The first embodiment as configured in figure 4-I, depicts a resonant body 42 interposed between the impactor 27 and the workpiece elements 22 and 24. The resonant body is composed of material with a selected sonic wave velocity, mass, and shape to both support a standing wave 42 and transform sonic impedance from the impactor to the work-piece. The schematic depiction in figure 4-II shows the resonant compression standing wave impinging on the workpiece. Further, that fraction of the sonic compression wave 42 transmitted through the work-piece is reflected back by lens 23, at a direction C, to refract and convert to a shear mode S within the workpiece. Resonance is sustained for a period of time sufficient to permit temporal and spatial coincidence of sonic compression and shear modes within the workpiece.

- Please amend the **first** sentence in paragraph **0022** as follows:

[0022] The sonic lenses depicted in figures 1, 2, 3, **and 4, and particularly the resonator depicted in figure 4, are specific examples of** numerous possible configurations designed to induce shear mode impulses, coincident with compression mode impulses, in single and multi-element work pieces.

- Please amend the **first** sentence in paragraph **0025** as follows:

[0025] Energy impulse sources may be selected from a number of forms such as: explosive charges or cartridges, mechanical impactors, single and multiple impact pneumatic sources, and electromagnetically impelled impactors.

- Please amend the **fourth** sentence in paragraph **0026** as follows:

Sonic filters **or resonators,** and impedance matching elements may be inserted along sonic wave paths to optimize power-spectral-densities and energy transfer.

Amendments to the Claims:

- Please replace the claims in paragraph **0033** with sub-paragraphs **0033.1, 0033.2, 0033.3, 0033.4,0033.5, 0033.6, 0033.7, and 0033.8**:

[0033.1] 1. An apparatus for sonic welding and materials forming comprising:

(a) a mechanical impulse source sonically coupled to single or multiple sonic waveguide(s), delay line(s), resonator(s), impedance transformer(s), and lens(es) which superpose high-power density sonic compression wave and shear wave impulses within the body of a workpiece;

(b) said mechanical impulse source generates high-power, single or multiple sonic compression wave impulses;

(c) said sonic lenses possess shape and composition attributes to focus sonic compression waves within the body of said workpiece;

(d) further, said sonic lenses possess shape and composition attributes to focus and mode convert sonic compression wave impulses into sonic shear wave impulses within the body of said workpiece; and

(e) said sonic wavegides, delay lines, resonators, and impedance transformers; which may be intrinsic to, or separate from the said workpiece, possess shape and composition attributes to direct and transmit sonic energy such that said

sonic lenses superpose compression and shear impulses within the body of said workpiece.

[0033.2] 2. The method of sonic welding of metallic materials with the apparatus defined in claim 1 wherein;

(a) sonic shear wave impulses, focused at the faying surfaces of a metallic workpiece consisting of two or more contiguous elements, transform all or part of said workpiece contiguous (faying surface) material from solid-to-viscoelastic state; and

(b) said sonic compression wave impulses, superposed on said shear induced viscoelastic material, fuse said contiguous metallic workpiece elements.

[0033.3] 3. The method of metals forming with the apparatus defined in claim 1 wherein:

(a) said sonic shear wave impulses, focused within the body of a metallic workpiece, locally transform all or part of said metallic workpiece from solid-to-viscoelastic state; and

(b) said sonic compression wave impulses, superposed on said shear induced viscoelastic metal, dynamically forge said metallic workpiece into a desired shape.

[0033.4] 4. The method of metallic materials substructure modification with the apparatus defined in claim 1 wherein:

(a) said sonic shear wave impulses, focused within the body of a metallic workpiece, locally transform all or part of said metallic workpiece from a solid-to-viscoelastic state; and

(b) said sonic compression wave impulses, superposed on said shear induced viscoelastic metal, modify metal substructure morphology;

(c) said substructure morphology modification in metals and their alloys be applied to relieve residual stress; and

(d) said substructure morphology modification in metals and their alloys be applied to selectively alter mechanical and physical properties.

[0033.5] 5. The method of sonic welding of non-metallic materials with the apparatus defined in claim 1 wherein;

(a) sonic shear wave impulses, focused at the faying surfaces of said workpiece consisting of two or more contiguous elements, transform all or part of said workpiece contiguous (faying surface) material from solid-to-viscoelastic state; and

(b) said sonic compression wave impulses, superposed on said shear induced viscoelastic material, cohesively bond said contiguous workpiece elements.

[0033.6] 6. The method of non-metallic materials forming with the apparatus defined in claim 1 wherein:

(a) said sonic shear wave impulses, focused within the body of said workpiece, locally transform all or part of said workpiece material from solid-to-viscoelastic state; and

(b) said sonic compression wave impulses, superposed on said shear induced viscoelastic material, displace said workpiece into a desired shape.

[0033.7] 7. The method of both metallic and non-metallic materials adhesive activation with the apparatus defined in claim 1 wherein:

(a) said sonic shear wave impulses, focused on an adhesive agent between two or more metallic and non-metallic workpiece elements to locally introduce i energy of adhesive activation; and

(b) said sonic comprression wave impulses, superposed on said activated adhesive agent, adhesively bond elements of said workpiece.

[0033.8] 8. The method of non-metallic materials substructure modification with the apparatus defined in claim 1 wherein:

(a) said sonic shear wave impulses, focused within all or part of the body of said non-metallic workpiece, locally transform said non-metallic workpiece from a solid-to-viscoelastic state;